



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

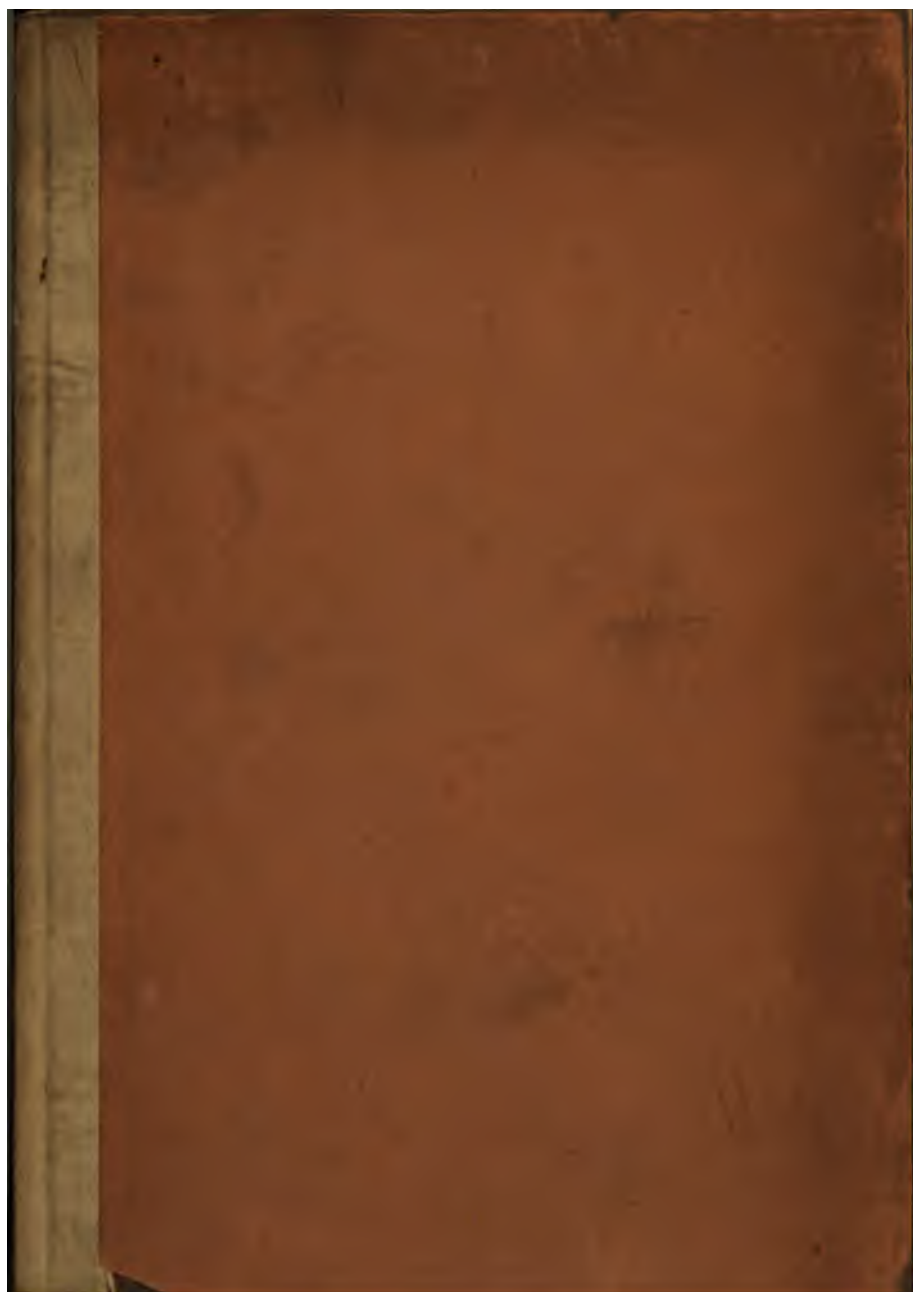
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

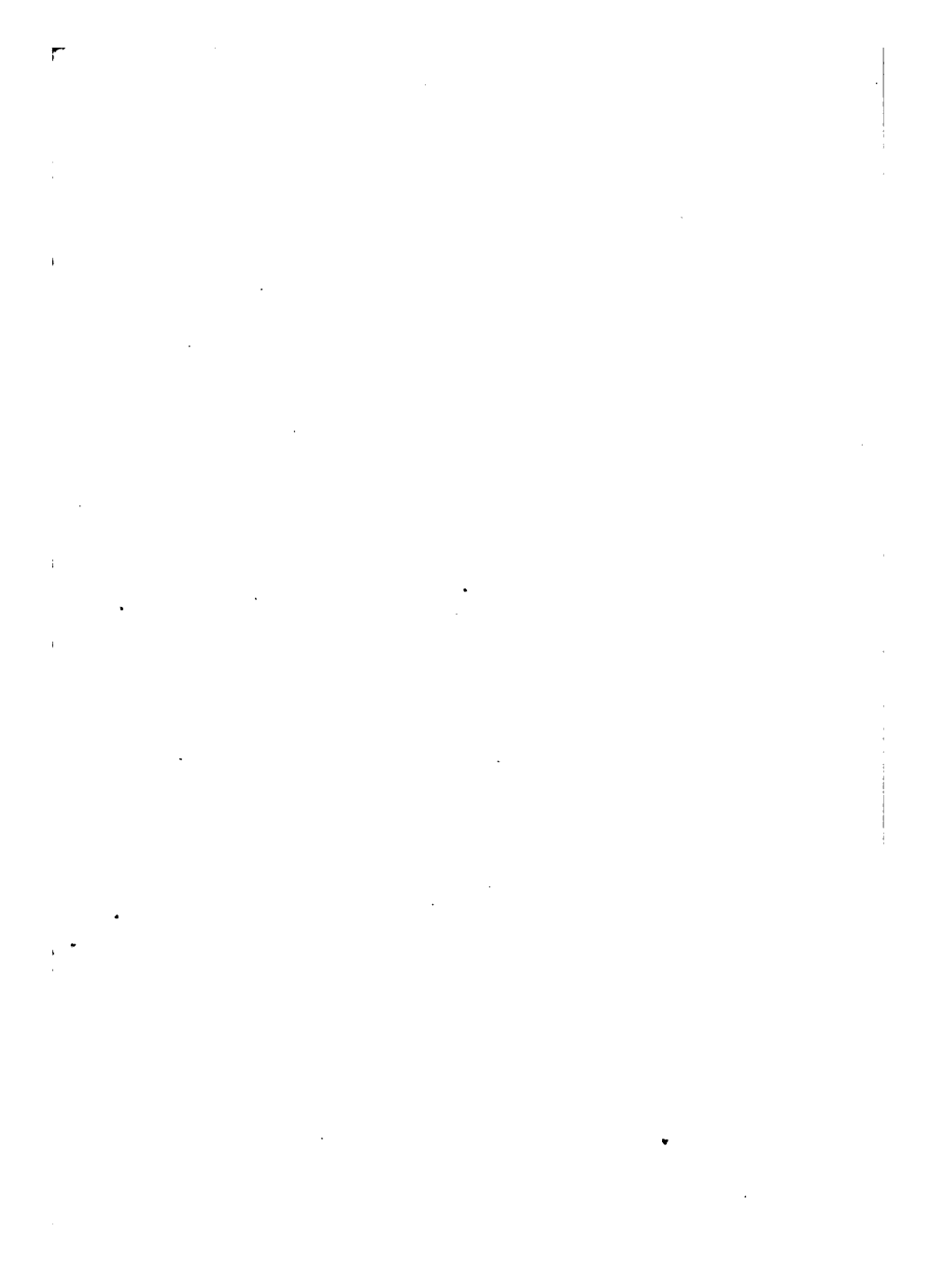
- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

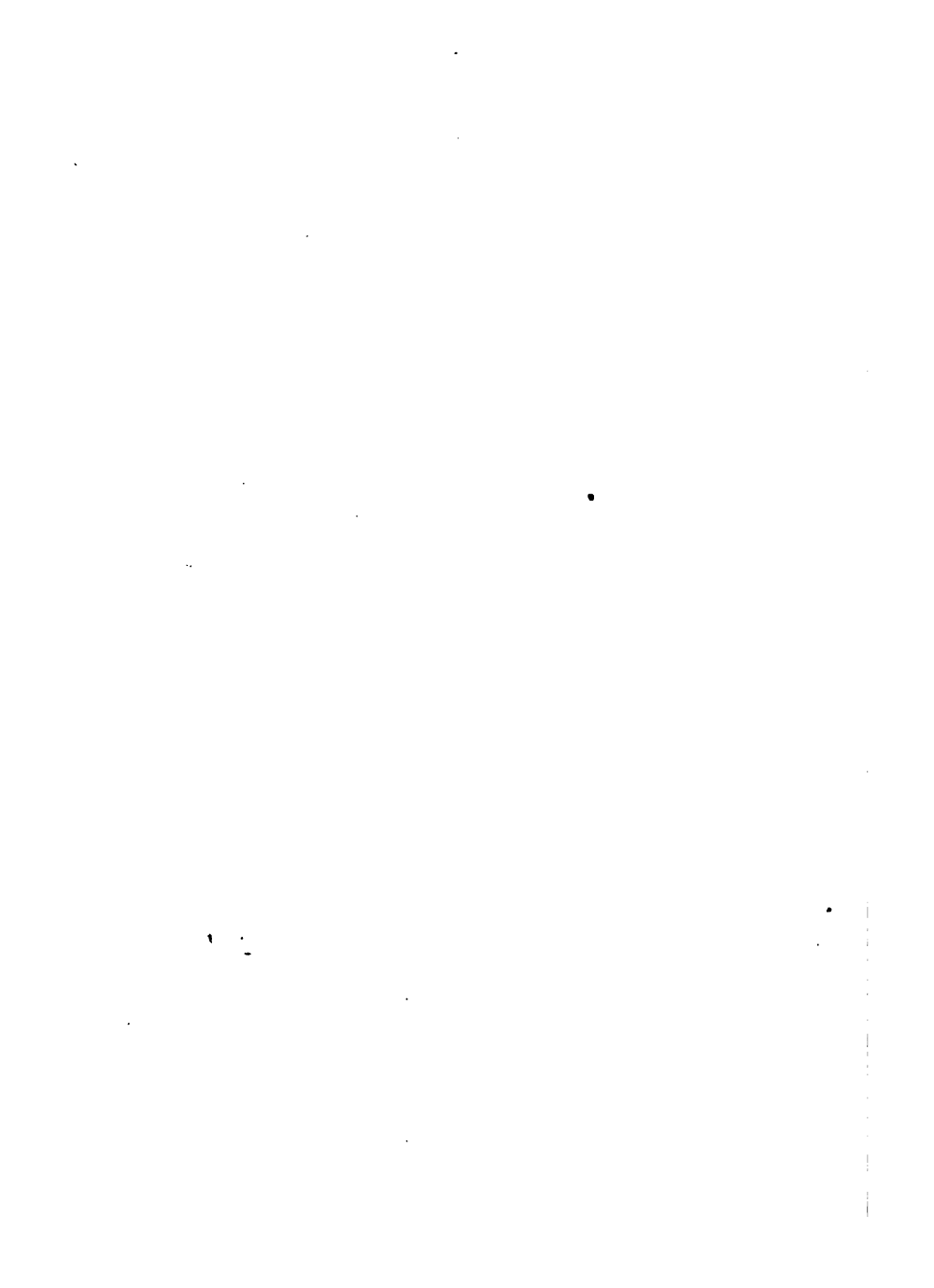
### About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>









112

CONFESSIONS,  
OBSERVATIONS & ANTICIPATIONS  
OF A  
TOWN SEWAGE FARMER.  
BY  
RUSTICUS EXPECTANS.

---

"LUCRI BONUS EST ODOR EX RE QUALIBET."

---

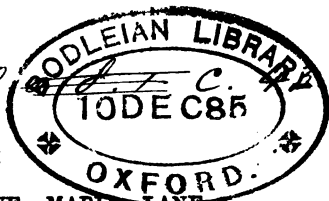
LONDON:

WHITTAKER AND CO., AVE MARIA LANE.

RUGBY: CROSSLEY AND BILLINGTON.

1861.

1930-2 f. 2.





## P R E F A C E .

---

THE following *brochure*, with the exception of a few pages at the end, was written about two years ago, and then thrown aside, because—

Firstly,—It was written hastily at a time when the writer's mind was slightly exacerbated by the smart of unfulfilled expectations, and therefore, perhaps, not without bias.

Secondly,—It seemed from its tone and title especially to be likely to give its readers, if it have any, an opinion of Town Sewage irrigation less favourable than the real facts of the case warrant.

Thirdly,—It had acted as a safety valve to the writer's over-charged feelings; his mind felt more at ease after it was written.

Fourthly, and lastly, and chiefly,—It was not considered to be worth the expense of printing.

Recently, however, when dragged to light for the purpose of finding some information for a friend as to the proper quantity of Town Sewage to apply to an acre of land, there was found in it so much that bears upon a question of importance to the public, judging from the columns of the "Times" lately, that the writer determined to send it at once to the printer with all its imperfections on its head "*pro bono publico*."

It pretends to no merit save that of speaking truth.

Rugby, Dec. 1860.







## CONFESSIONS, & c.

---

LET me begin at the beginning:— I was born—yes, that is quite as much as you require to know, and a fact you might have arrived at without my telling you, “my pensive public!” What can it signify to you that “I had a grandmother, and she had a donkey?” Of more consequence is it that I bespeak your sympathy, by assuring you that I have performed the three great duties which entitle a member of the Commonwealth to be called a good citizen. I have begotten sons, I have planted trees, and I have written—I was nearly writing books, but conscience said have you really written books? My good conscience tells me what a book is and I will speak truth. We have heard the celebrated defence of a culprit that “it was only a little one,” but that would not satisfy either judge or jury, notwithstanding the legal dictum, “de minimis non curat Lex,” nor can you, O conscience, say that small books are not books, so that third part of my claim to good citizenship must be allowed. Besides, if I was to bind all my little scribbling indiscretions, including the present, in one volume, would not that be a book? Well, not to detain my public any longer from the feast which awaits it in the following veritable confessions, for notwithstanding my somewhat dirty-sounding occupation, I can and will make

a clean breast of it, I shall now plunge in "medias res," not into the sewage tank, sweet reader believe me, so do not throw down this paper in disgust; but I will take you to the banks of Shakspeare's classic stream, the silver Avon, having done which, I must just pause a moment to say that I believe I ought to have chosen a Shakspearean quotation for my motto. With a slight addition I might have given a double reading suitable enough either way to my case:—

"Sweet are the uses of { Adversity } which like a toad,  
                                   { Town Sewage }  
 ugly and venomous, yet bears a precious jewel in its head.'

Here we are, however, merely separated from the said classic Avon by two railroads, in close proximity, and a sloping meadow. On our left hand, is a small edifice of red brick, with a tall chimney, from the summit of which issues a long folio volume of black smoke; lower down, near the eaves of the edifice, issues a duodecimo of white vapour, in intermittent puffs; these, and a heavy, panting, grinding, growling noise, proceeding from the interior, tell unmistakeably of the presence of the true Thaumaturgus of modern days—the steam-engine. On our right hand, or rather near to our right foot, is a large round stone-built pond or tank, full of a dark-coloured fluid, with an unutterably horrid-looking scum on its surface, and, strange to say, something very like a lively monster gambolling, and plunging, and diving about in it, causing multitudes of air bubbles to arise on the surface, and stirring up the filthy cauldron from its lowest depths. We are now at the "fons et origo" of my interesting confessions, the troubled sea which truly casts up mire and dirt.

Now my very first *confession* shall be one for the sake of justice. I confess then that the odour is not so bad as the look would lead one to suppose, still it is best to keep to windward of it. That steam-engine on the left, and this round Stygian pool on the right, represent what is going on in all parts of the world—money digging, extracting gold from a dirty source, and too often by dirty means; mammon slavery as well as mammon worship is universal; disguise it as we will the love of money is in every breast, latent, perhaps, in some, but still there, equally there, as in the more obvious phases of its fuller development. Yes, so surely as “man’s heart is deceitful above all things, and desperately wicked,” so surely is “the root of all evil” there, the love of money. And as in the olden days, “Money made the mare to go,” so in modern times it works the steam-engine, and makes the lightning run its messages. Intellect bows down to it; science obeys its behests; nothing is there so lofty that it does not affect, nothing so base that it scorns to inter-meddle with. The “*auri sacra fames*” is insatiable. Nothing comes amiss to its voracious craving. Man, proud man, feeds high the lust of gold with his own flesh and blood; he buys and sells his brother man, created in God’s image, and man, proud man, stoops down to cess-pools and to sewers, to garbage and the ordurous refuse of the scavenger, to gratify the same base craving. Kind reader, pardon me, too long I have left you standing between steam and sewage, tank and engine, but who could help, in such a situation, to moralize on filthy lucre. One minute more ere we proceed: look back behind yr

and the fields slope upwards till the view is closed in by clustering cottages and houses tall, church towers and edifices scholastic, with that umbrageous intermingling of trees and foliage, and shrub, and bower, which gives so great a charm to the scenery of a rural town or village in Old England. There lies the town of Rugby, famed, as thou well knowest, reader, for its school and Dr. Arnold, also, as thou perhaps knowest not, for its thirteen cattle fairs and obedience to the despotism of a Board of Health. Far on beyond its bounds rises THE WATER-TOWER, a square exotic on a rising ground, crowned with a red tiled roof; its upper story, one hundred feet high, coloured with bands alternate white and blue, contains an iron tank fitted to hold 50,000 liquid gallons; steam-engine, pump and pipes are there to speed the cleansing fluid through the town; all, all is there but—unlimited water. The pioneers of civilization, as some philosopher has observed, often suffer for the benefit of mankind, and Rugby has experienced the truth of the sage remark. In her desire to keep the lead in modern sanitary improvement, she has been the victim of theory. In order to obtain an unlimited supply of water, the natural reservoir, or land-drainage system, was tried, and for some mysterious reason stopped short. The area drained was not sufficient for the dry climate of the centre of England; nor is it easy to understand why the able report of Mr. Rammel, C.E., was not fully carried out. Now, an Artesian well is sinking, on the recommendation of another C.E., Mr. Hawkesley, but as yet 1000 feet of bore has not succeeded in providing water. Still the supply of water, though limited in unusually dry

seasons, is large. In 1859, a very dry year, the average quantity supplied to the town was 97,000 gallons per diem : maximum 190,000, minimum 35,000. In 1860, maximum 190,000, minimum 80,000. There are also wells and pumps in great abundance. The whole town, containing from 8000 to 9000 inhabitants, is laid with tubular drain or sewer pipes, no cesspools are allowed, and the whole sewage passes down at once without decomposition into the circular tank at our feet. Here then we have nearly the whole sewage of a town with above 8000 inhabitants intercepted by this circular open tank on its way to the river. But lest the silver Avon should be too much polluted, the overflow, if any, and on Sunday there is much, runs into two filtering tanks adjoining, where the refuse is retained, and the water flows on, clear and pellucid as itself at least, to mingle with the waters of the said classic river. Now let us enter the red brick edifice on our left. There may be seen a steam engine of 12-horse power, working a pump with cylinder of 12-inch diameter and 2-feet stroke, connected with the circular tank. What next becomes of the precious dirty fluid? It is forced by the power of steam through a main iron pipe of 6-inch diameter for some twenty yards, thence three branch iron pipes diverge of 3-inch bore, transmitting it to help to fertilize a large extent of land. Over an area of 400 acres the pipes are laid, having in every field through which they pass at certain distances an orifice with upright stand or hydrant, to which a hose can be applied at pleasure to shed the liquid over the surface of the soil.

Through or within reach of 190 acres of my farm

these iron pipes are laid, and six days in every week the precious fluid flows through the iron veins twelve hours in each day as fast as the diameter of the pipes and the power of the steam engine allows it.

Well can I picture to myself the look and tone of voice of some enthusiastic farmer sanguine as myself, who reading so far, exclaims, What an uncommon lucky chap! I only wish I had such a stream of muck running through my farm!

Ah, so thought I at one time, and so I think even now; but gold may be bought too dear, and so may muck. Hinc illæ lachrymæ; hence these *confessions*, my neighbour. Reader, did'st thou ever hear the name of Edwin Chadwick? Did'st thou ever read a thick blue pamphlet, 167 pages long, presented to both Houses of Parliament by command of Her Majesty, the first line on the blue cover and on the inner title page consisting of these four words, "GENERAL BOARD OF HEALTH," ordered to be printed for the use of Local Boards of Health, and intituled: "Minutes of Information collected on the Practical Application of Sewer Waters and Town Manures to Agricultural Production?"

Happy for thee, if living near a town and of a sanguine temperament, that thou did'st not, my brother. I did; and in an incautious hour I believed, and acted on my faith. Now I verily believe, and am credibly informed, that the aforesaid Edwin Chadwick was the originator of that Blue Book. If so he has much to answer for. Not that he alone is to blame. A man may have a hobby-horse and ride it to death if he pleases, and confident in

the merits of his steed may persuade others to ride with him; but when he acts as government jockey, with all the authority of public Boards to back him, he should first test the merits of his steed most unmistakeably. It may be said that such test should be applied by every prudent man before embarking capital: and that is true, but only partially so, for on the experience of others, if trustworthy, we must all depend at times, and for things more important still than sewage. Besides, "Nemo mortalium omnibus horis sapit," i.e., Nobody always sleeps with one eye open, whether Yankee or Britisher, knowing Yorkshireman or canny Scot. Be that as it may, I *confess* that I gave more credit to the Blue Book than I might have done or perhaps than I ought to have done. I knew well what results followed the application of town sewage near Edinburgh. I knew the £30. per acre of rent to be a fact, and I gave credit to the assertion or insinuation that the waste of fertilizing matter there was very great, and that in excessive dilution was the best mode of applying town sewage. Mr. Fortescue says, at p. 11 and at p. 66 of the Blue Book: "Four or five times the extent of land might I believe be brought into equally productive cultivation under an improved system of drainage and a *more abundant use of water.*" Again at p. 78, Mr. Lee's report says, speaking of the Edinburgh Sewaged Meadows, "The result when reduced to a practical shape, is strongly against the economy of surface irrigation by open gutters and surface shedding when compared with the effects produced by pipes and jet hereafter to be considered." In fact the whole work is intended to induce the public to believe on authority



that the application of Town Sewage by means of the hose and jet will be most economical and effective; that the system has succeeded in both these points when the liquid manure from farm buildings has been used, and no reasonable person ought to doubt the production of similar results from a similar application of Town Sewage.—See pp. 144, 151, 154.

Dr. Gilbert at a later date writes very differently. “I would here remark that it is a matter much to be regretted that the public mind should so frequently have been misled as to the application of dilute town sewage for crops generally, by reference to the use of liquid manure on farms, where not only the amount of its fluid, but its concentration, and the time of its application are entirely under control. With the very different circumstances of town-sewage vanishes entirely the foundation for any conclusions regarding it from such experience as that alluded to. In the one case we have a limited amount of fluid, any desired concentration by the addition of manure, and perfect control as to the time of application; in the other, the dilution unavoidable, an immense supply constant, and the time of application almost entirely beyond control.” Whether I had sufficient evidence here to justify me in the outlay of capital or not, matters but little. I *confess* I might have been more cautious; I *confess* also that my desires went along with the statements of the blue book. I believed, and was very glad to have an opportunity of trying the experiment, and carrying into practice the fertilising prospects of Mr. Edwin Chadwick.

“ Edwin, I believed thee true,  
 And I was blest in so believing,  
 Now I regret I ever knew  
 Thy book so plausibly deceiving.”

I *confess* I went rather fast, I bought land and rented more, all laid or being laid with subterranean iron pipes, and under agreement to be manured with the town sewage. The state of matters was this:—when the town was placed under the provision of the Sanitary Act, and the system of tubular sewage drains adopted, there were two different persons who desired to rent the manure; one gave way to the other on the understanding that certain land of his should be sewaged on certain terms, and it was this gentleman's land I bought with his agreement, which was briefly this: the land was to receive five dressings per acre in the course of the year at twenty shillings per acre to cover all expenses. When we began to work, the question arose how much is a dressing? This was made a reference to Mr. Mechi, who decided on 9,000 gallons!!! Had it been such liquid as I have seen in his circular cesspool of concentrated filth at Tiptree Hall, his estimate might not be much out of the way perhaps, but I knew and stated then what experience has since sadly proved to me, that so small an amount as 9,000 gallons on an acre of land of town sewage is useless, or at least, that the advantage is almost inappreciable, from the large amount of water it contains. A year's trial proved that the agreement would not work. So a new one was made. I took more land, and at present have three branch lines of iron subterranean piping, one

hydrant on each of which is open every day in the year except Sunday, for twelve hours. I find my own hose and labour, and pay £150 of yearly rent. Now, this on nearly 200 acres would not be an exorbitant price for manure per acre, but in truth, so far as I at present see it will not effectually manure above fifty; indeed, I incline to believe that thirty acres is nearer the mark, and moreover, that the hose and jet system will not apply it so economically or so efficiently as open gutters where the land is suitable. I do not mean to say that there are not great advantages attending the power of application in smaller quantities at any period of the year to any particular crop or portion of a crop which may require manure in the liquid form, but for real downright honest manuring the quantity required to produce effects, anything resembling the Craigintenny meadows near Edinburgh is enormous. At Page 78 of the Blue Book it is calculated that about 8,000 tons per Scotch or 6,000 per English acre, are every year applied over the Edinburgh meadows. For my £150 in 1856 there was applied to my land about 30,860 tons, rather more than enough for five acres on the Edinburgh system! With me it was spread over a much wider surface, and I have no doubt that my hay crop and herbage in general were much benefited; but having then only newly entered on the land I cannot compare the produce with that of former years. After the first year's trial I ceased to apply it to red or ploughed land, and but seldom to the turnip or other root crop, and each year I have concentrated it more and more upon the meadows or Italian rye-grass; for this last crop it

is well adapted, but I have never yet been able to trust to it alone from insufficient supply. I apply the liquid manure from the farm offices, and the ammoniacal liquor from the gas works by means of the watering cart likewise, and perhaps an occasional touch of Guano, where the crop seems to require it, from the possibly unequal shedding of the hose. My crops of Italian rye-grass are good, but nothing like what one reads of. Taking old and young together, the average seems to be about twenty-five tons to the acre, at three, four, or five cuttings, as the case may be. In one field of first year's crop, 1859, five cuttings yielded fifty tons. Far the most evidently successful and economical application is by means of small open gutters, cut from the hydrant along the highest ground, and the liquid flowing continually, during twelve hours of the day, over some portion of the field. But the quantity issuing from my three-inch pipes, is by no means sufficient to keep the grass growing for fifty or sixty cows. It is not easy to calculate how much liquid each three-inch pipe gives, from the varying force of the engine and length of hose in use, but we believe about twenty-two to twenty-three gallons in a minute, say 15,400 gallons per acre, or seventy tons, per diem, or on an average about 21,000 tons per annum. Now, Dr. Gilbert estimates that every ton of excrementitious matter, which if dry, would be worth rather more than a ton of best Peruvian guano, would in the form of sewage, be diluted with nearly 4,000 tons of water, or manure of £15 value is mixed with 4,000 tons of water. I thus arrive at an approximation to the value of the sewage annually shed upon my farm. If each hydrant

gives 21,000 tons, that is equal in value to five and a quarter tons of guano, now selling in Rugby at £14 per ton, or £73 10s.; this multiplied by three, gives £220 10s., and it costs me, including labour, &c., about £200. My bargain is, therefore, evidently not a good one, that is to say, if I expended the same sum in guano, or other artificial manures, it would be greatly more to my advantage, for these reasons: the liquid, in such large quantities, can only be applied to grass or some other succulent crops, and in my case it must be applied every day, not only in summer, but in winter, when it is comparatively of little value; whilst, on the other hand, guano or other portable manures can be applied when and where most requisite. Still there are great advantages attending the use of sewage manure in the liquid form. It only requires that the mode of farming should be adapted to it, and a sufficient quantity be applied at the right time, and in the right manner. Here, perhaps, my reader may expect, or at least it would be natural for him to expect, to hear the opinion I have formed of the right mode of farming, of the right time and manner of applying town sewage. I must then *confess* at once that I do not think myself qualified to lay down the law. Who am I, that I should dictate to skilful agriculturists and scientific farmers? But I can give the ideas I have formed on the subject from *observation*, and the three or four years' experience I have had, and a discerning public may take them at their value, which is exactly as much as each of my readers likes to put upon it. I will begin at the beginning—the town, and say that the

system of tubular or pipe drains for conveying away the sewage is excellent, when there is sufficient fall and plenty of water. At Rugby, the sewage matter arrives at the tank, a quarter of a mile from the town, in less than half an hour as a general rule, and if a stoppage should occur in any one of the small pipes it is at once discovered, and easily put right by means of the water jet and hose. The experience of Rugby under somewhat unfavourable circumstances with regard to water is decidedly favourable to the tubular system. A separate drainage for storm and surface water would be an improvement, having a connection to make use of if required, either for flushing at any time or adding to the quantity of water in the sewage tank. It will be observed that the whole sewage matter arrives at the receiving tank before decomposition takes place, and there is no reason but the expense why it should not proceed onwards at once night and day to fertilise the land. At Rugby it does so during the twelve hours of daytime, and is actually applied to the soil, without decomposition. It is only when close to the hydrant that any odour can be perceived. In its rapid passage from the town to the tank, and again through the smaller iron pipes to the land, the fœcal and other solid matter and sediment becomes so much triturated that not only do the valuable parts become more easily dissolved, but in fact when the stream issues from the hydrant, to the common observer it has the appearance of clean water. Of course when the tank is nearly empty, and the sediment there is then stirred up, its appearance at the hydrants is

dark enough, but under proper arrangements that sediment need not be there, at least to any considerable extent.

The kind of farming best adapted to the sewage irrigation is dairying or a combination of milch cows and sheep. The former fed constantly in the house, and the latter partly so. All grass land does well under the sewage, but the fields should be as even on the surface as possible. In Warwickshire much of the old pasture is under high ridge and furrow and that presents serious obstacles to the sewage irrigator, unless there be considerable fall in the ground and open gutters be used. A gradual slope of the land is advantageous, but the hills and valleys of the old pastures are fatal to liquid manuring with hose and jet, especially for cutting in succession. There is no kind of crop which answers better for feeding cattle under the liquid manure irrigation than Italian rye grass. But in order to obtain continuous cuttings of this valuable forage the supply of sewage must be most abundant. No plant is more gratefully sensible of manurial favours, especially in a liquid form. The greatest drawback experienced by me in cow feeding has been the want of sufficient irrigation in the months of July and August, when to the detriment of both stock and pocket I have been more than once forced to turn my cows into the open pastures for a month or six weeks. Considerable judgment is required in ordering the rotations and successions of the different succulent crops for house feeding, and after all success must depend in a great degree upon the atmospheric character of the season. Heat and drought will not suit Italian grass, but heat and moisture it delights

in. It is a very thirsty plant and likes its drink strong, indeed it can hardly be over dosed with liquid sewage. Ammoniacal liquor from gas-works without dilution will burn it up, but even that it will imbibe when diluted far stronger than other plants without injury. The best time for sowing it seems to be in the months of August or September, but for house feeding it must be sown at various times. A cow will require about one hundredweight per diem on an average. Having now briefly stated my experience as a guide to others, I must add that I have by no means lost heart as to the value of the sewage itself, all depends upon the mode and time of application. I can imagine no better way to dispose of the sewage of our towns under the existing system of water-closets than by irrigating the land; and under proper management it may be made to pay good interest at least upon the proposed outlay, if not indeed to pay off the whole in time. The first error committed at Rugby was not taking advantage of the fall in the ground, and using gravitation instead of steam; another error was extending the iron piping over too large an area; again, the pipes were too small, and the engine not of sufficient power. If we begin at the first step no one will deny the necessity of sanitary regulations for towns and villages whereby the sewage shall be removed without prejudice to the health of the inhabitants. No community will be found to object to a moderate rate for this purpose. Such a rate would convey under the tubular system with plenty of water, the whole refuse of the town a quarter of a mile outside the town, in a short space



of time. Next comes the important question, what is then to become of it? All agricultural chemists are now agreed upon the point that to secure all its manurial advantages when the water system is in use, it must be applied to the land in a liquid form. What is there then to prevent the whole sewage matter in its liquid state from being forwarded on from the receptacle provided by the town to the land in the vicinity? I know of none save the expense. Is that insuperable? I think not; but it is impossible to give here calculations of any service, as each town must be regulated by its situation not only with respect to level, but also with respect to suitable grass land for the reception of the liquid sewage. It seems to be pretty well ascertained that the effect of sewage irrigation is greatest upon light soils, or at least when the subsoil is open and sandy, such as some of the land in the vicinity of Edinburgh, but there are not wanting instances of great effect upon stronger land, only of course judgment is required as to quantity. The enormous amount running over the Edinburgh meadows amounting to 8,000 tons per Scottish acre proves little, because the waste is known to be excessive, and after passing over one portion it is made by steam to fertilize another portion, which it does equally well. There is one place, however, near Edinburgh, which affords some guide as to quantity. On the farm of Lochend, the enterprising occupier, Mr. Scott, has erected a breast water-wheel, of seventeen feet diameter, which is turned by the stream of sewage, and works a pump forcing the liquid through an iron pipe up to a level some fifteen or eighteen feet higher, where it is

applied to Italian rye-grass, by means of gutta-percha hose of two and a half-inch diameter. The grass is cut five times in the year, and after each cutting it receives two dressings of from 48 to 50,000 gallons each, shed over it through the hose, or about 500,000 gallons per acre in the year. Mr. Taylor, the intelligent overseer, from whom my information is derived, told me that the sewage is never applied until a week after the cutting, when given earlier it was found to injure the plant. We see here that about 2,200 tons of liquid sewage are applied each year to the acre, and the result is a produce of at least forty tons of grass per acre. This field lets at £30 per imperial acre the first year, and £20 the second year. The process of cropping is this: the first year, the land is manured with farm-yard dung for early potatoes, which are lifted about the beginning of July, it is then ploughed and sown down with Italian grass, about three bushels of seed to an acre. In the autumn, a cutting is generally obtained, which brings £4 per acre. The next year, the cutting begins towards the end of March, or beginning of April, according to the season; that year five cuttings are taken, at £30, and the year following, the same at £20, making, in fact, £54 per acre, for the crop of grass, or £27 per imperial acre per annum. The subsoil is very open, being a sandy gravel of great depth. It seems, from this practice at Lochend farm, that from 2,000 to 2,273 tons per acre are enough to produce very good crops of Italian rye-grass. If we apply the same amount per acre at Rugby, the result would, in all probability, be as good, provided the soil be

well underdrained, and the liquid applied at the right time. There seems no reason to doubt that if the 20,000 tons, which I may probably receive on each line of pipe in the course of the year, was to be concentrated upon ten acres of Italian rye-grass, from February to November, the crop on that land would be worth £20 an acre to me, at least, for feeding my cows in the house. The next question is, what state would it leave the land in, for breaking up the third year? This must depend greatly upon the quality of the soil.

Mr. Taylor, the overseer at Lochend near Edinburgh, does not think the value of the sewage to be accumulative; that is to say, he mentioned having known some long sewaged land broken up, on which "no crop would grow to any good."\* The light sandy soil seems to be indebted for its fertility to so much of the sewage alone as it can retain whilst the crop is growing, but one would imagine that the stronger land of England would retain to a greater extent the valuable manurial constituents of the sewage. The experience of the Craigintenny Meadows and others near Edinburgh goes to prove that the value of the sewage is accumulative in some degree from the fact of the older meadows, that is, those which have been longest under irrigation, producing the most grass—some of them letting by auction for as much as £40. per imperial acre. With respect to the salubrity of sewage

---

\* See an article by Professor Way, "On the Power of Soils to Absorb Manure," in *Journal of Royal Agricultural Society*, XXV., 1850.

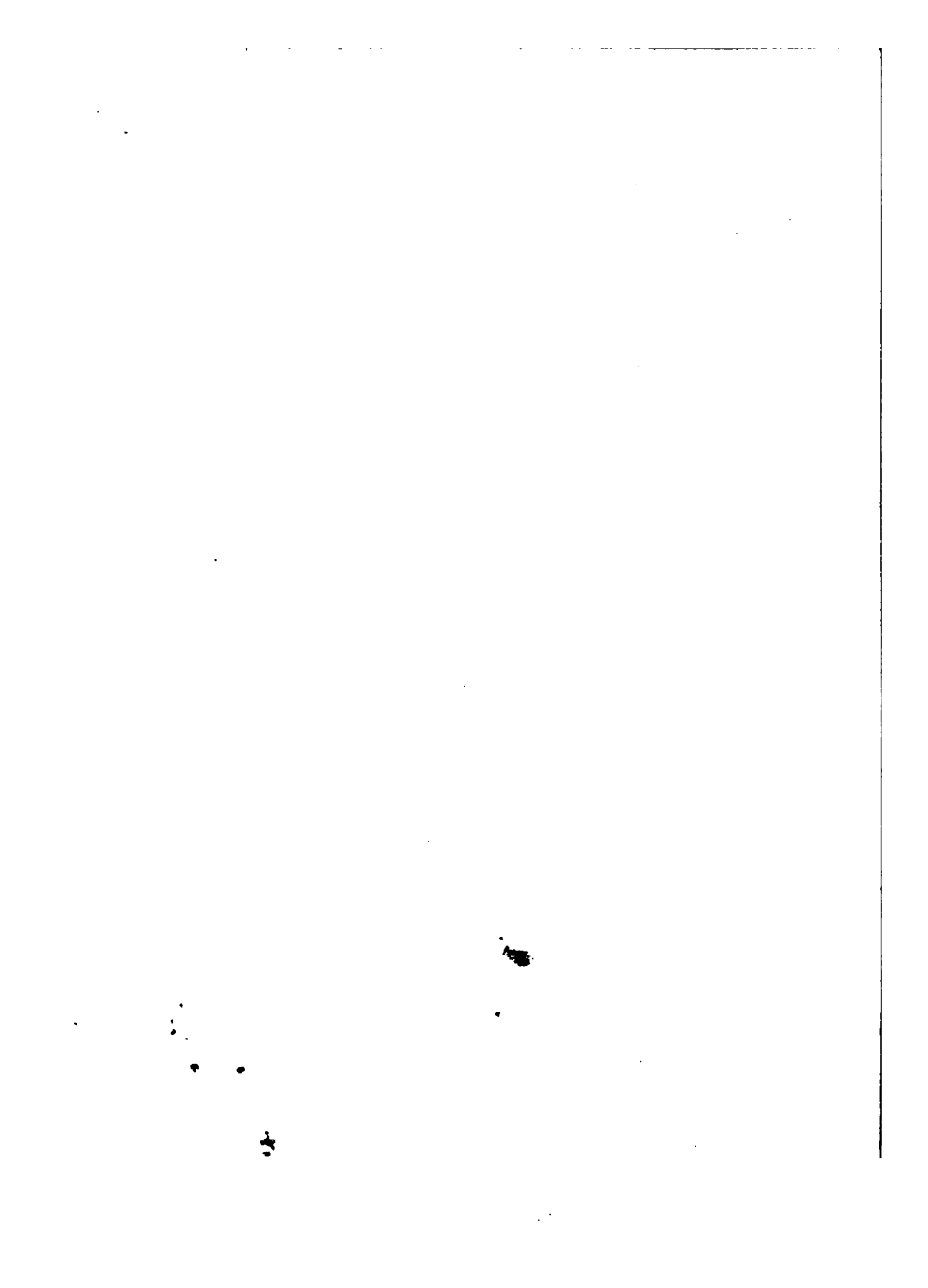
application by means of open gutters, it seems to me that there is more apprehension of danger than there need be, judging from the Craigintenny Meadows. These meadows extend from the thriving borough of Portobello, the great sea bathing place for Edinburgh, to Leith, its large bustling populous sea port. Through the very middle of these meadows runs the railway, and also a broad and excellent high road. After flowing over the meadows the sewage falls into the sea or sinks into the sands, and along this seashore people are constantly bathing in summer. No one ever hears of illness arising in consequence of the sewage irrigation, nor do the bills of mortality of the two places mentioned above show a greater average of deaths from what are called preventable diseases than other places of a like population.

As applied at Rugby, before decomposition takes place of course there can be no danger, and the land is the best deodorizer possible.

Hear Mr. Alderman Mechi on a point no one will controvert. "Permit me to say from practical experience that there is no deodorizer so powerful, so copious, or so cheap as the natural soil. After heavy applications of farm sewage ten times more offensive than that which issues from our sewers, to my pasture land, no indication of its whereabouts could be traced on the following day; and I have been agreeably surprised to see my cows feeding on the very spot irrigated twenty-four hours before. We all know that cows are particular in their feeding." For my part I have seen cattle feeding on grass which had

been irrigated with town sewage the same day. At the same time there can be no objection to using M'Dougall's disinfecting mixture near a town as at Carlisle. When I inspected the works there in the month of November, 1860, the irrigation was not going on, but it struck me that the whole sewage of Carlisle could not possibly flow through the small pipe 10-inch diameter or a foot at most, so that the river can scarcely be kept free from pollution. No place can be better adapted for sewage irrigation than the land held by Mr. M'Dougall at Carlisle. But grazing with heavy cattle will not do. Feeding in the house is the only way to turn the sewaged grass to profit, provided the distance it is carted be not too far. If Mr. M'Dougall tries this plan with all proper appliances he will yet find that he has a good bargain at Carlisle. Accurate experiment is at present wanting as to the feeding capabilities of sewaged grass, nor has the quantity necessary to produce paying results been tested by measurement, but steps are being taken at Rugby to remedy these most material deficiencies in our knowledge of sewage farming. I *confess* they ought to have been taken at Rugby much sooner, and probably such would have been taken years ago by you, my intelligent reader, not being, as I have been satisfied to remain too long,

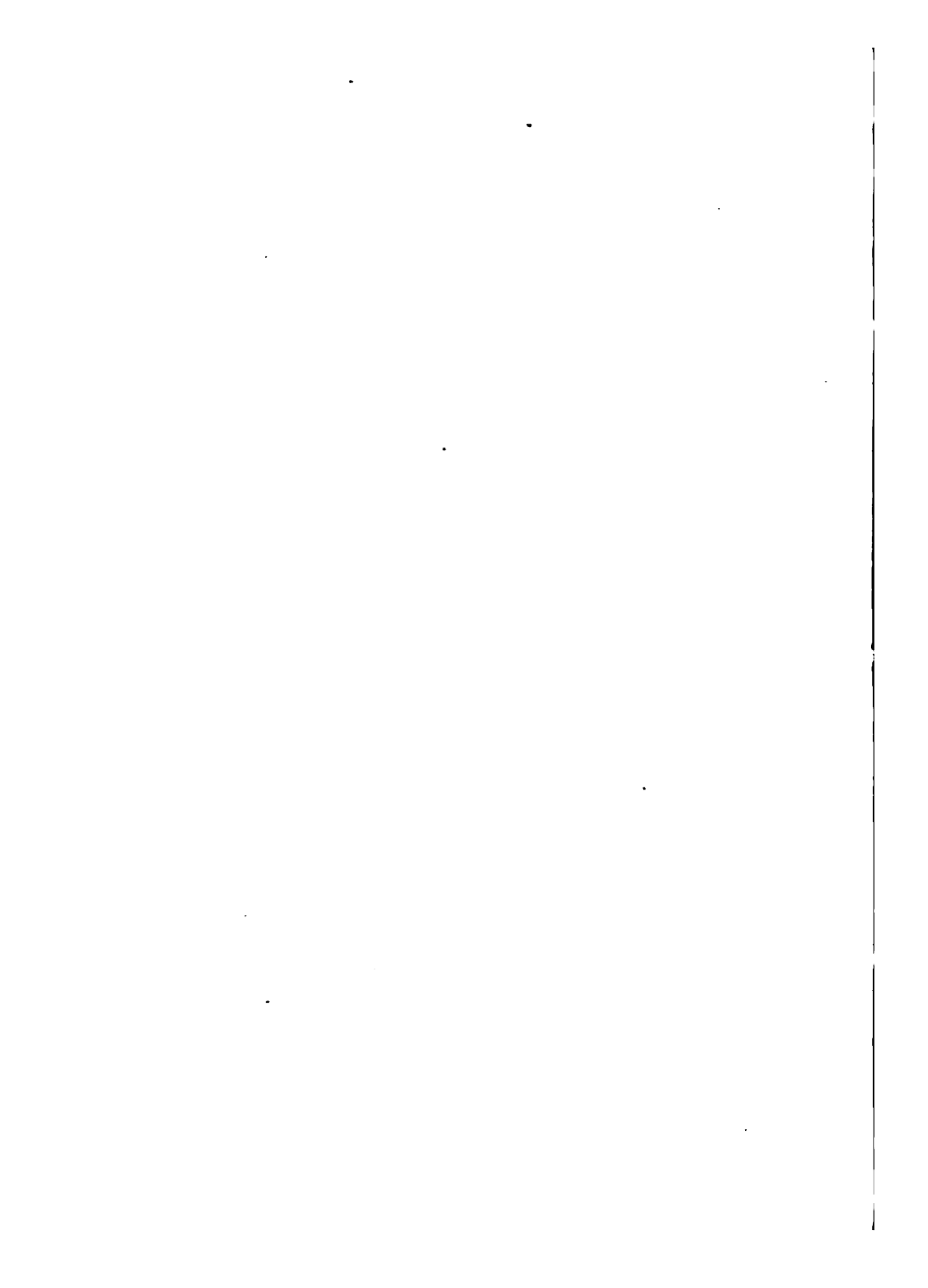
RUSTICUS EXPECTANS.



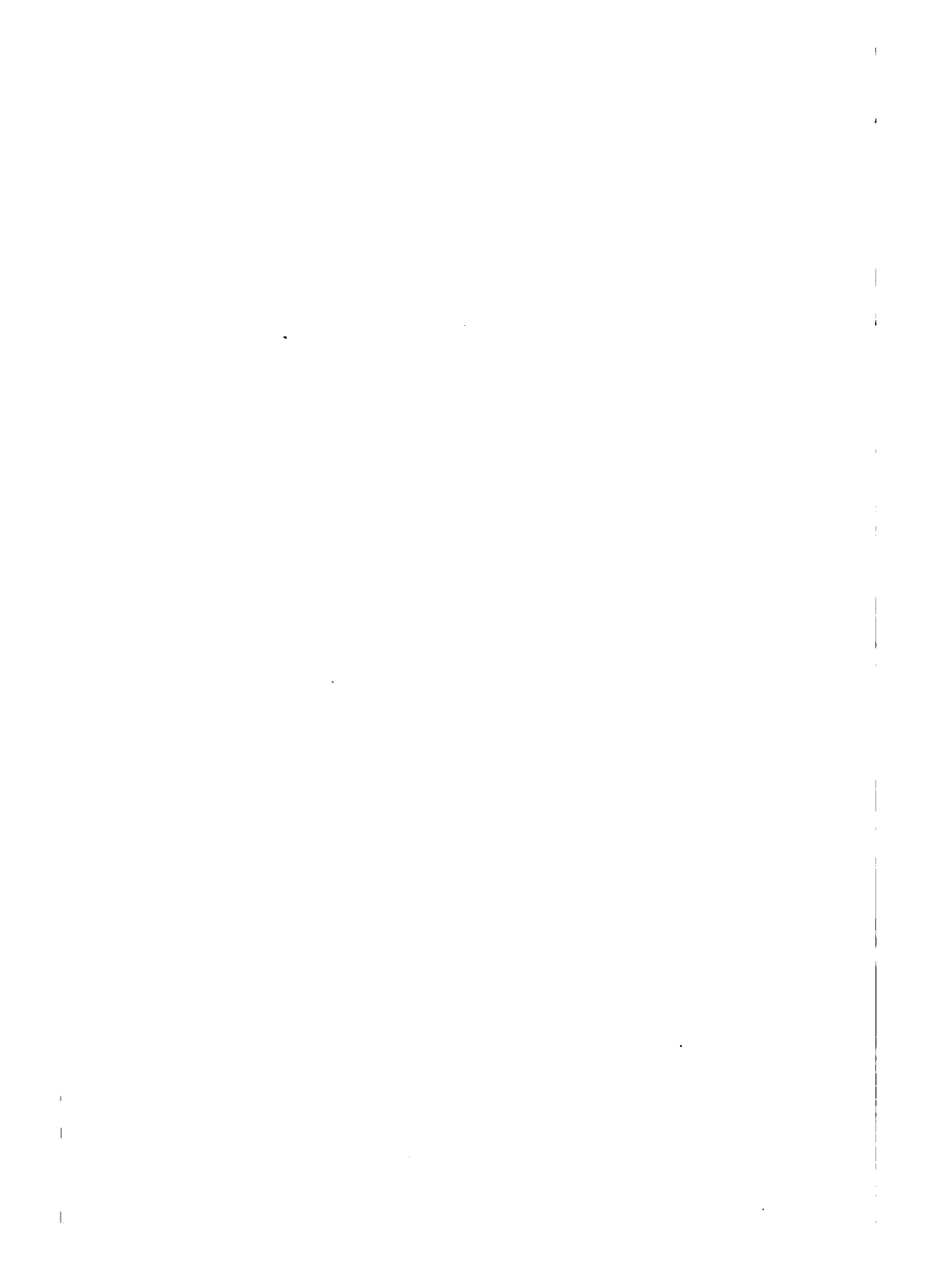




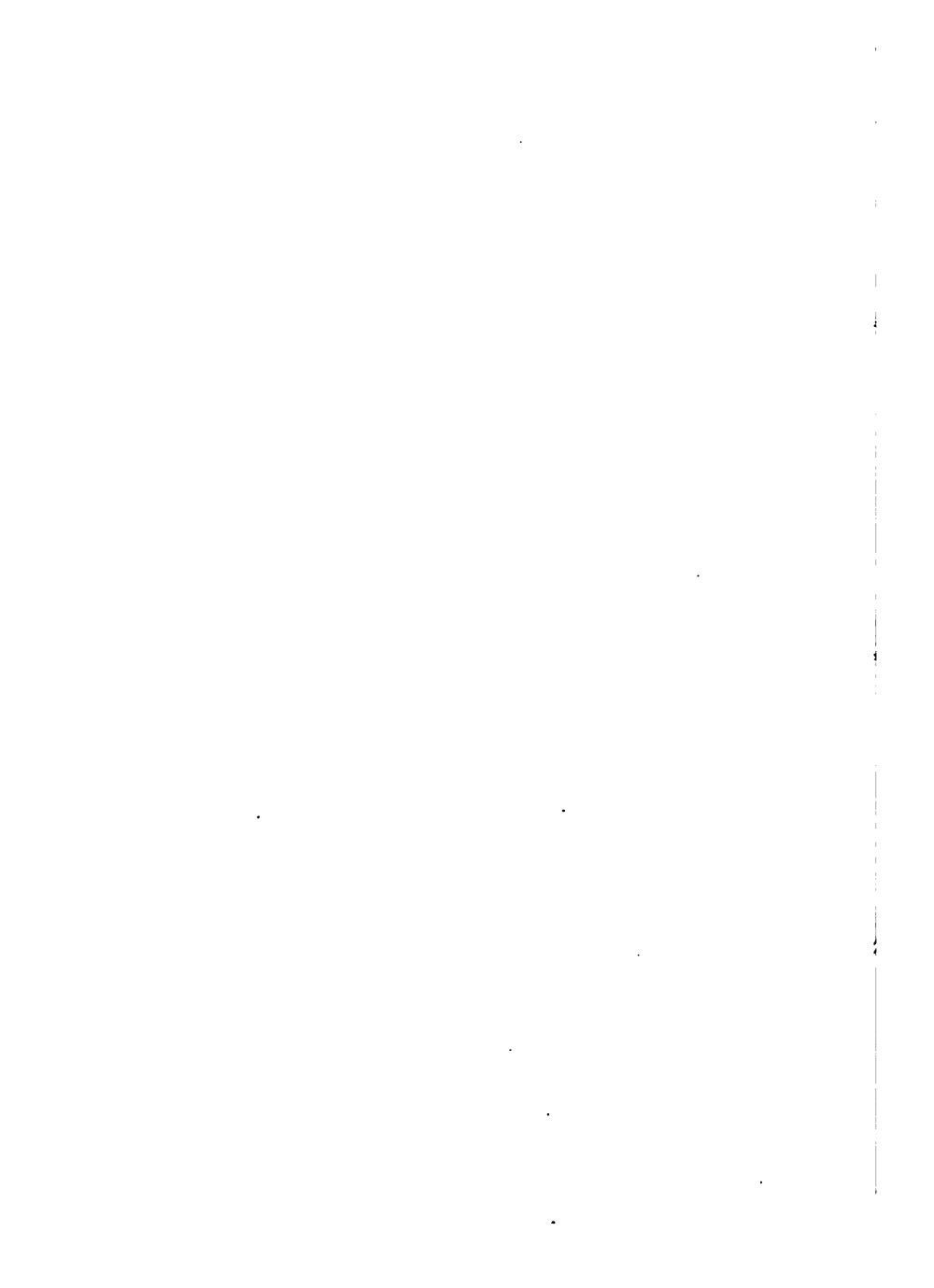


















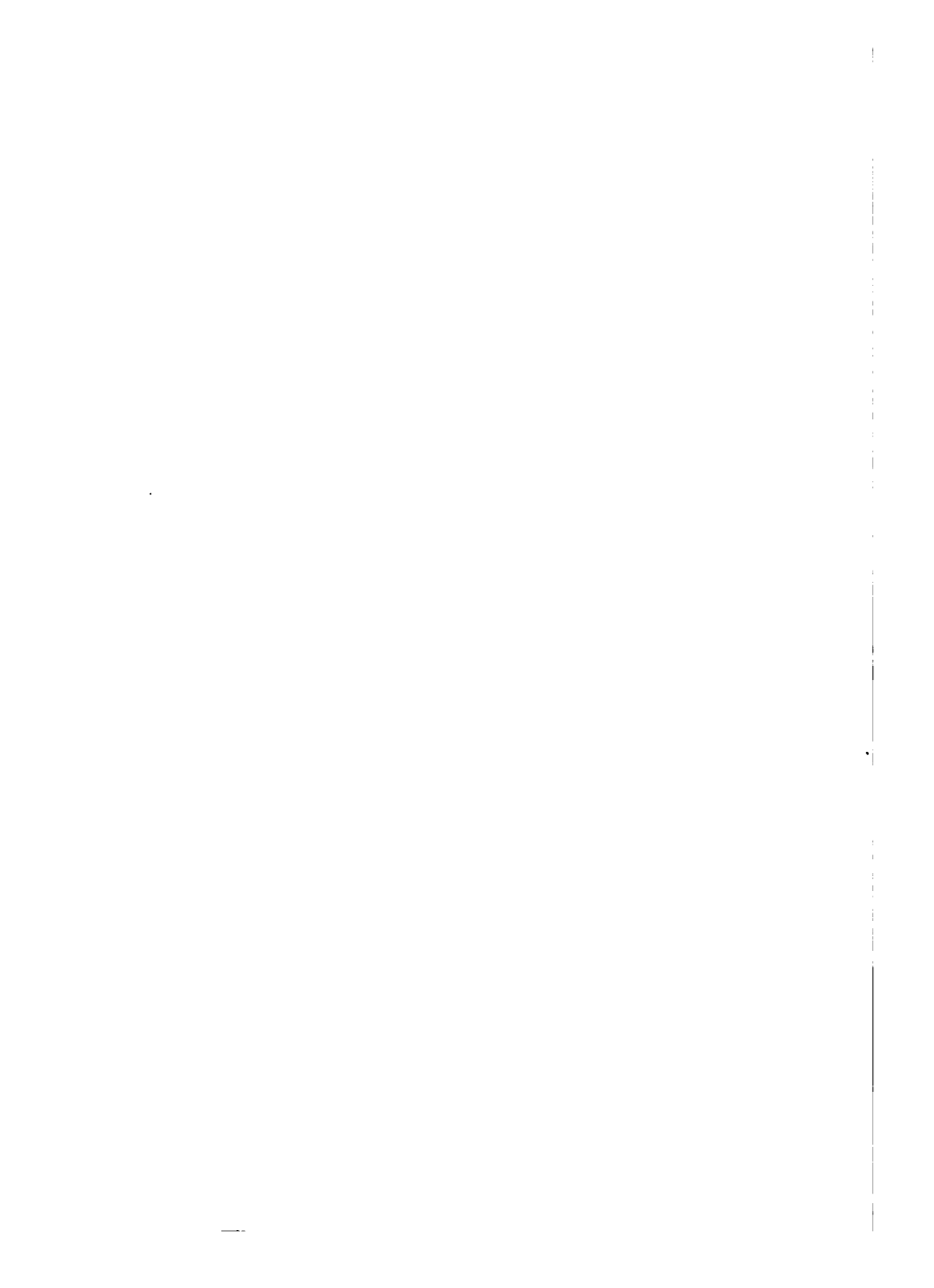




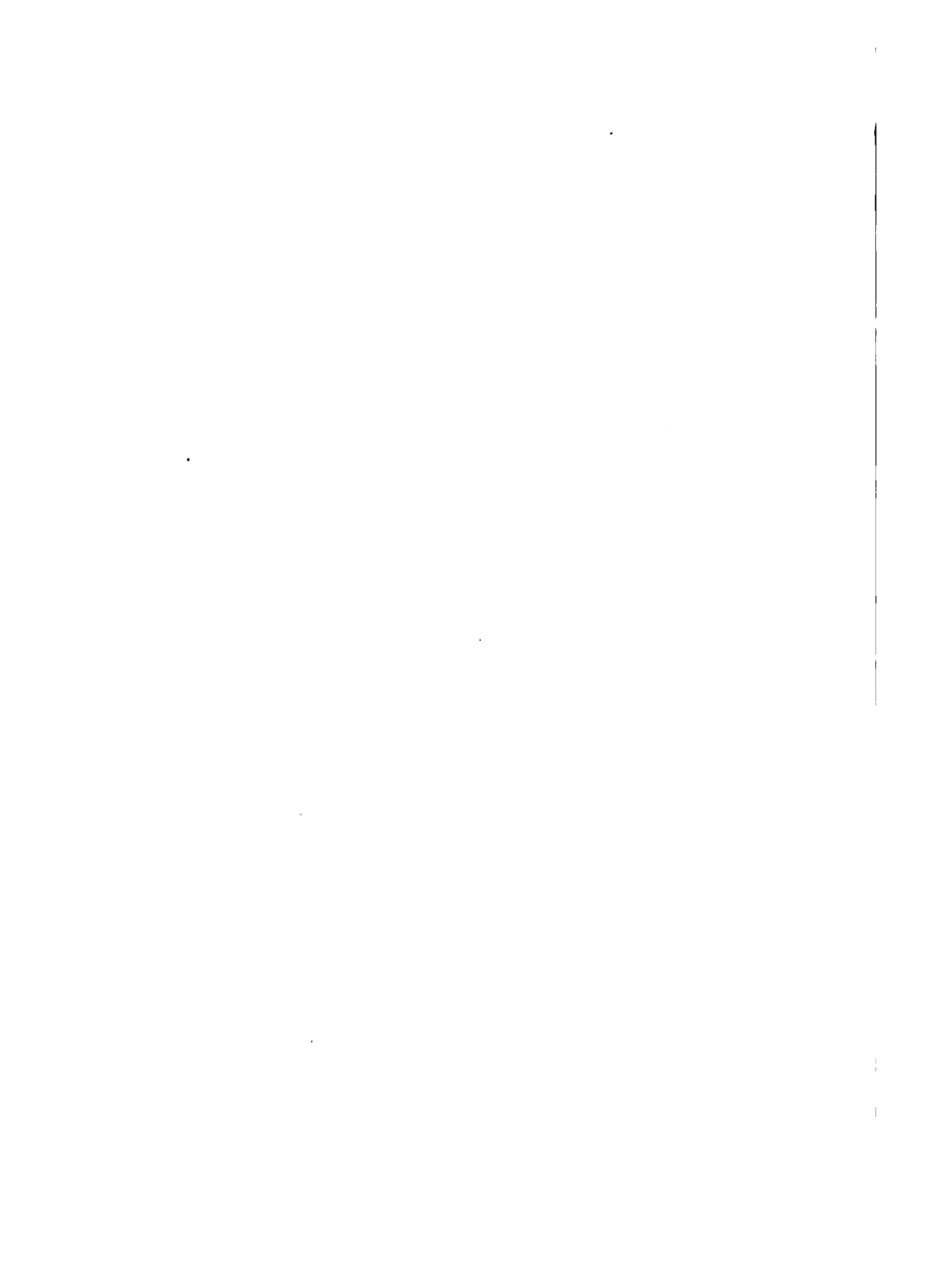














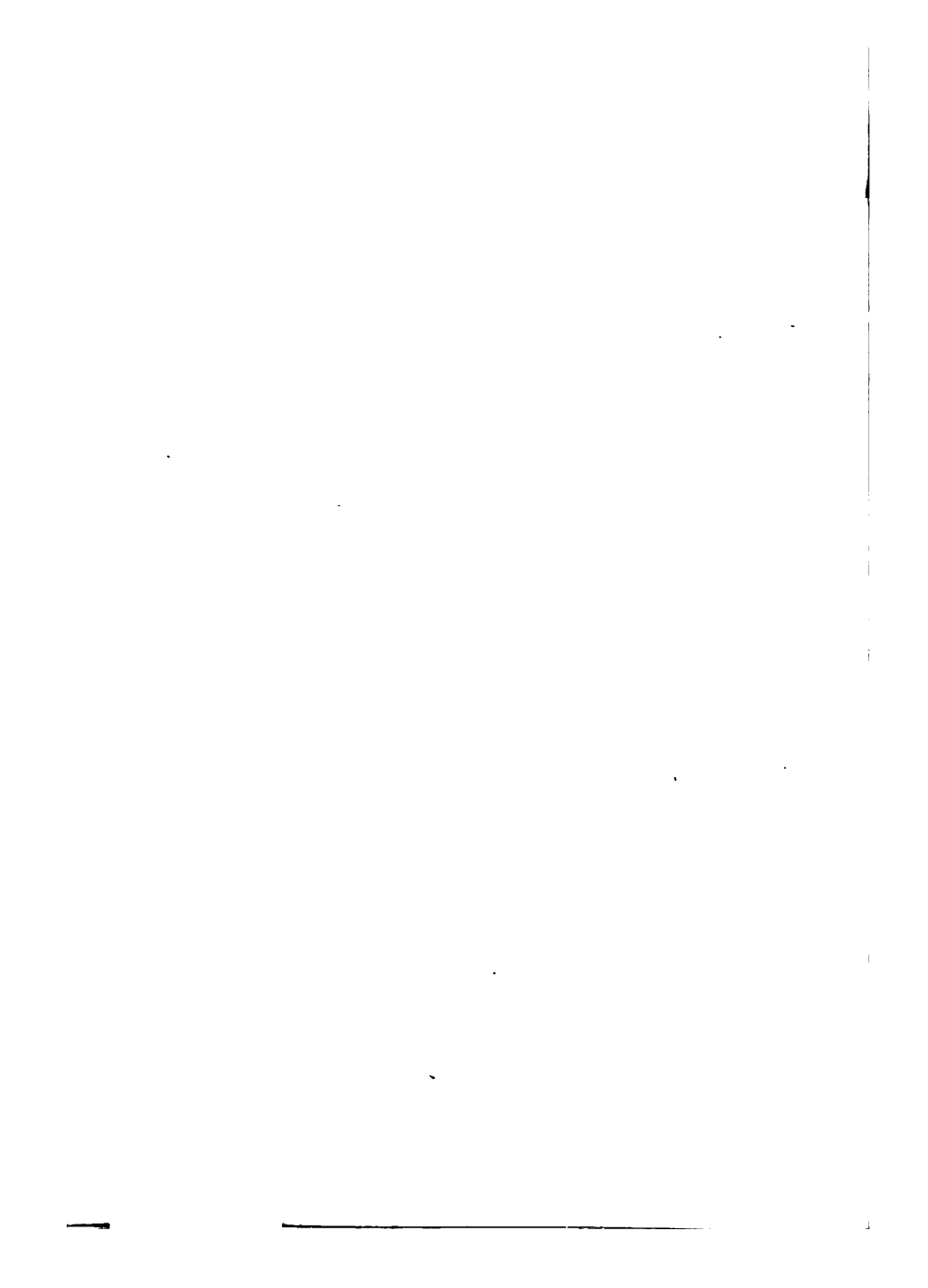


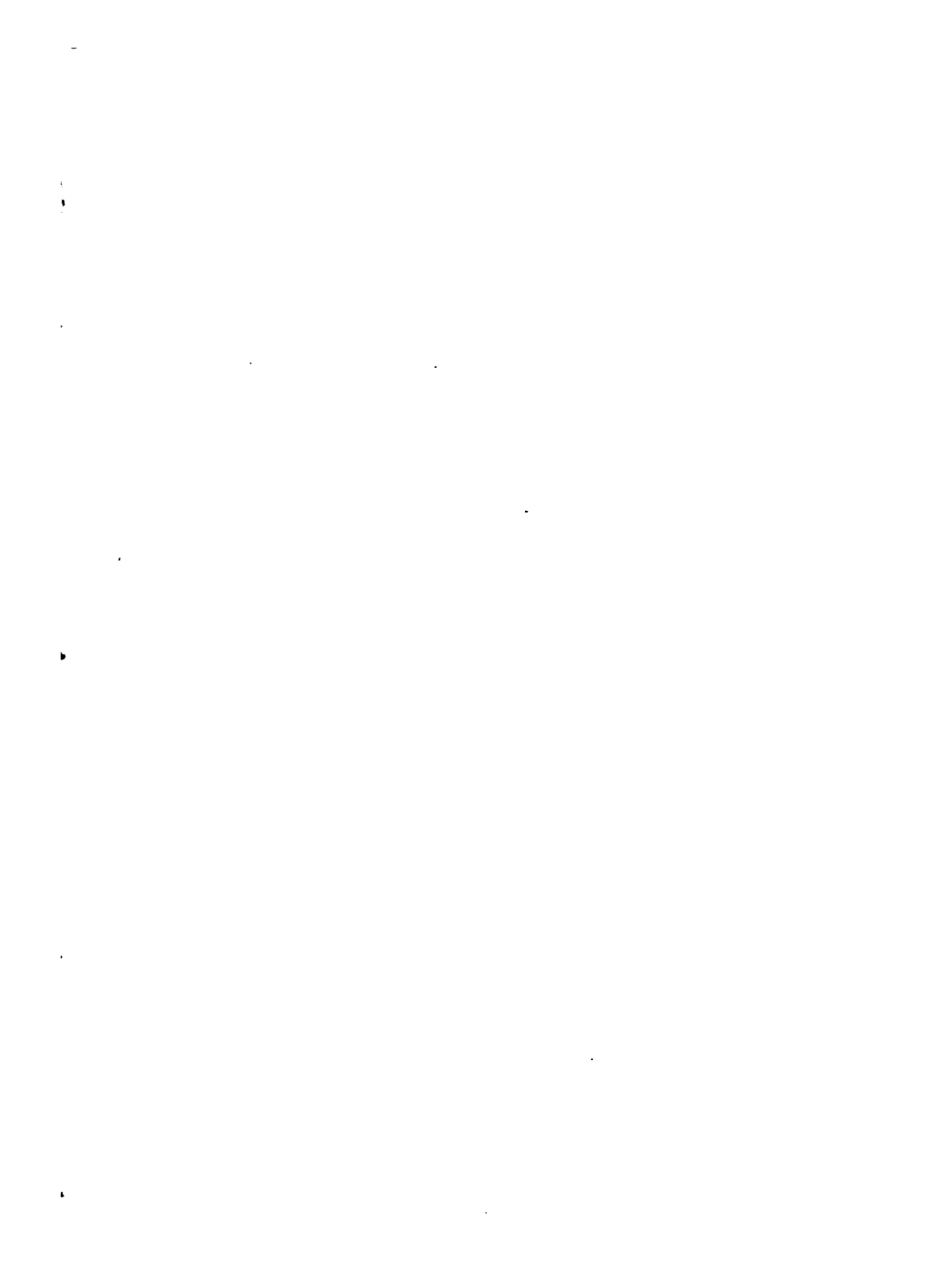




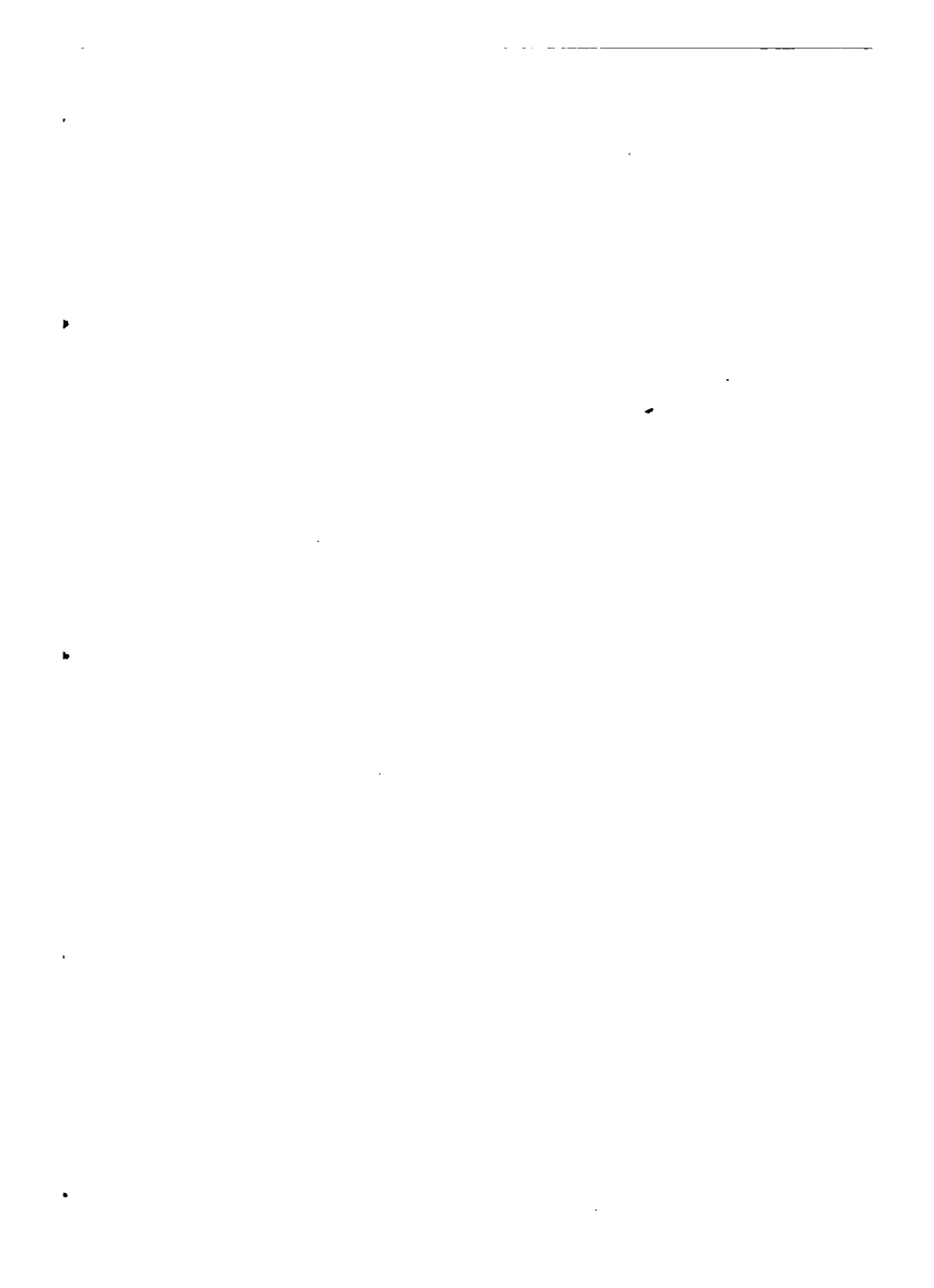






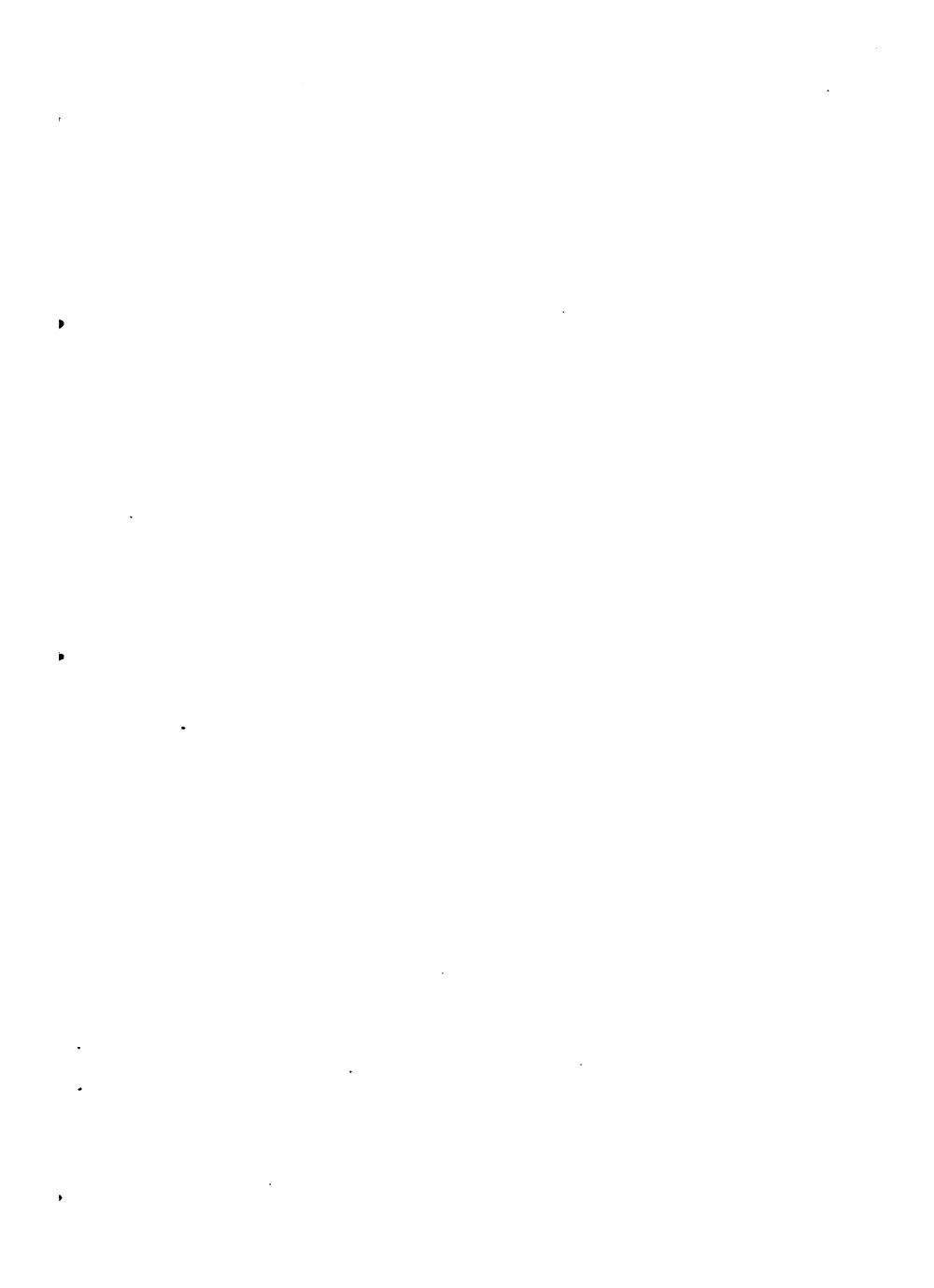


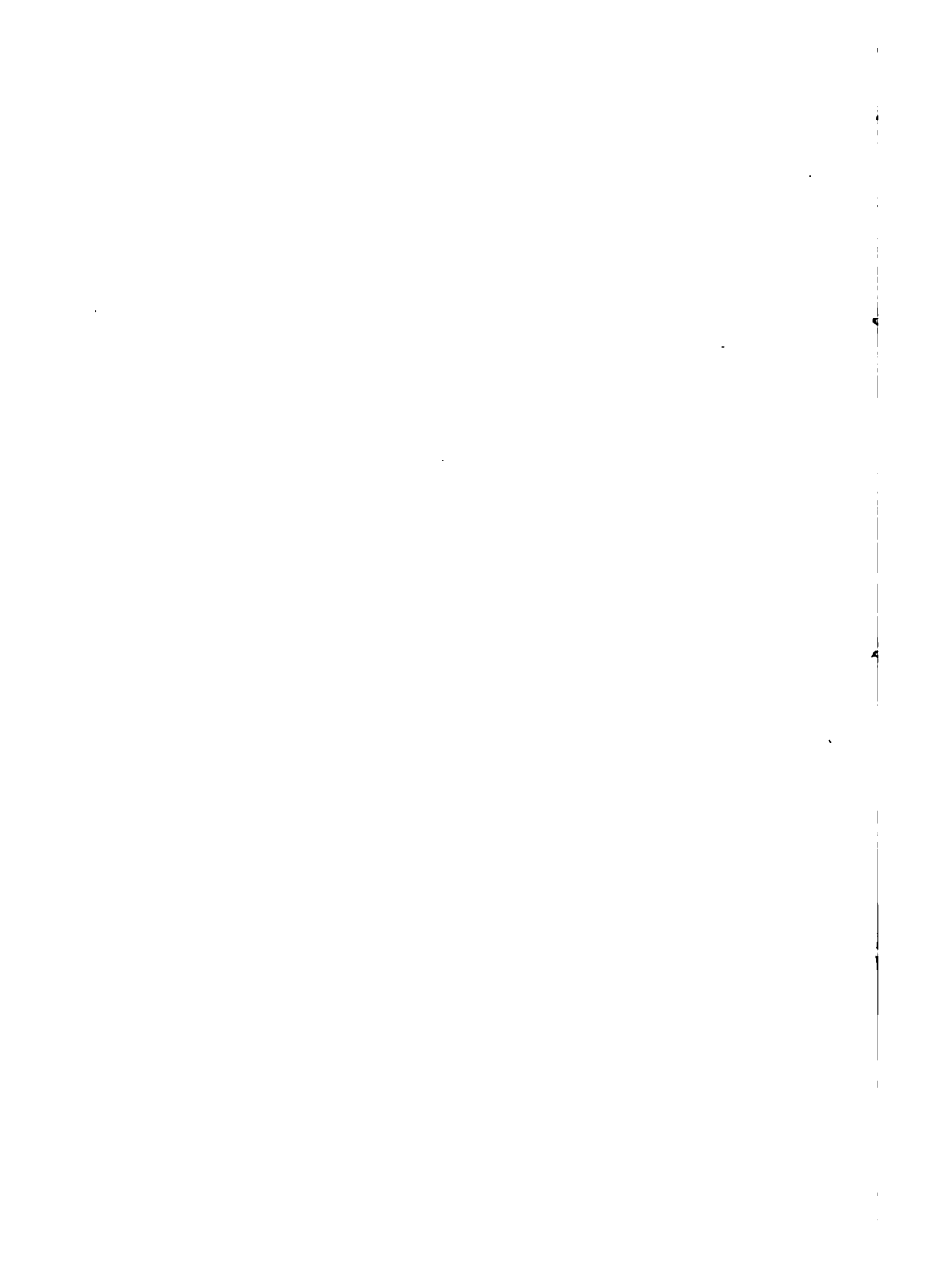




















•

•

•

•

•

•





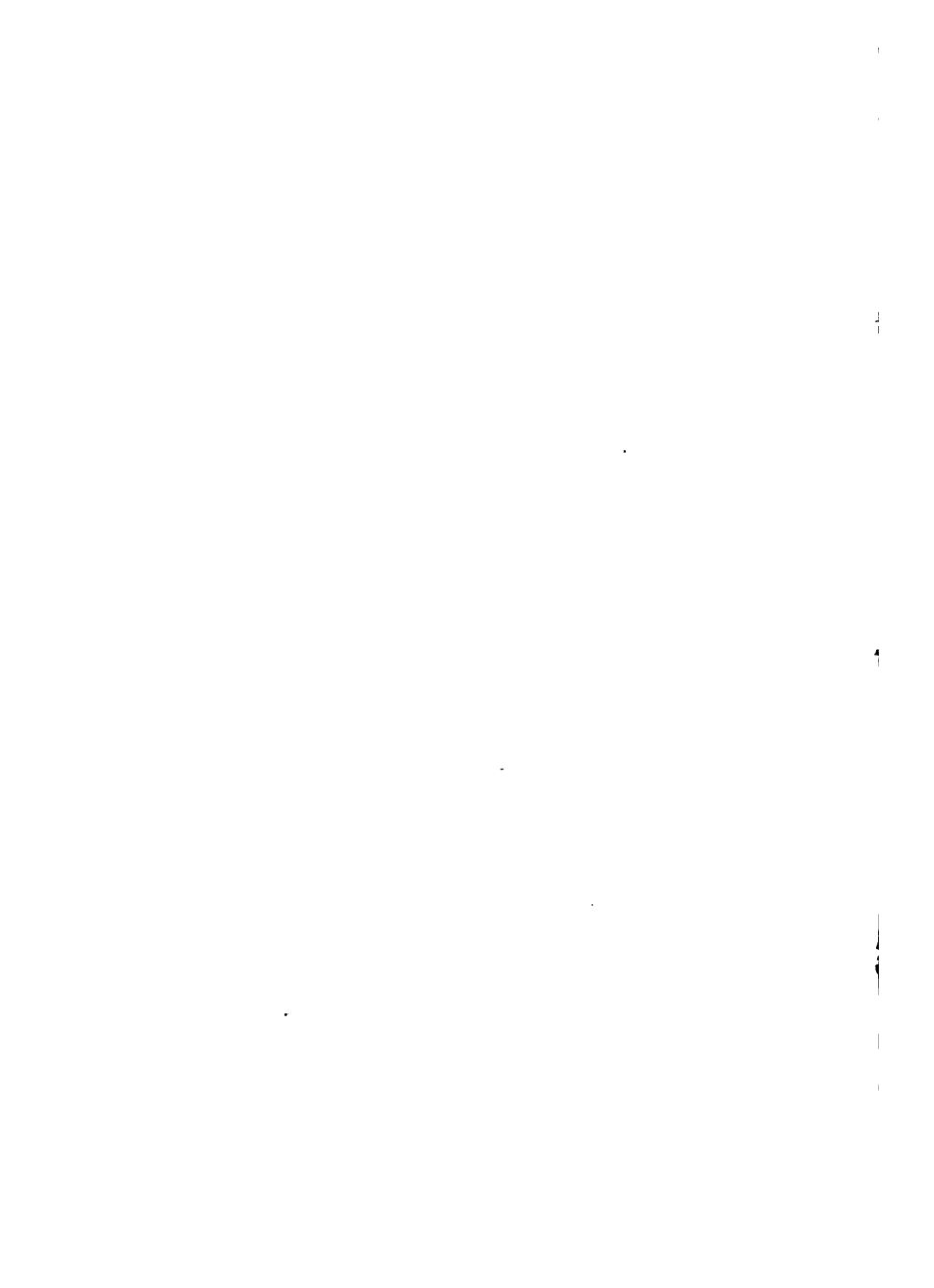






















1

2

3

4

5

6



